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SUMMARY

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Upper Volta

THE GROUNDNUT : INTRODUCTION OF GENETIC SELECTION METHODS OF ROSETTE-RESISTANT STRAINS IN UPPER VOLTA

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THE GROUNDNUT:
INTRODUCTION OF GENETIC SELECTION METHODS OF ROSETTE-RESISTANT STRAINS IN UPPER VOLTA

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1. (a) A virus disease known as "Rosette", endemic in the western region of Upper Volta, caused such havoc to the groundnut crops that the peasants have well-nigh abandoned cultivation of the latter.

(b) An essential prerequisite to any development of the groundnut crop in the area was the search for some means of combating the disease. This problem was tackled by the I.R.H.O. Station at Niangoloko in 1956.

2. The "Rosette" Disease.

(a) Since 1907, when rosette was described for the first time by ZIMMERMAN, it has been observed by many other authors in all regions of West and East Africa.

(b) The symptoms of chlorotic rosette, the form of the disease occurring most frequently in the Haute Volta, may be summarised as follows:

(i) Chlorosis of the new leaves which turn pale yellow.
(ii) Marked decrease in the length of the leaf stalks and of the internodes giving the plant a "tufted" appearance.
(iii) When the new leaves appear they are very small, curled, folded over and chlorotic, with dark green stripes or veins.
(iv) The yield may fall by 95 - 100 %.

(c) The vector of the disease is an aphis, the Aphis leguminosae Theo. One method of combating the disease might be the destruction of this aphis by a suitable insecticide.

(d) However, the I.R.H.O. opted for a solution which would prove more economical for the farmers of the Volta, namely the provision of seeds of selected rosette-resistant strains.

3. Rosette-Resistant strains

(a) In 1956, surveys carried out in fields of local groundnut plants suffering considerably from rosette made it possible to select some plants which had remained unaffected.

(b) Testing of the resistance of descendants of these plants revealed that some of the new varieties thus created did in fact possess a resistance to rosette, and that this resistance was transmitted unimpaired from one generation of plants to the next. It was not simply a question of a mechanical phenomenon (i.e. a harder and therefore less punctured surface in the resistant strains). It was therefore certain that there would be no weakening of the resistance through adaptation by new strains of aphids.

(c) The studies carried out with these varieties established by selection have revealed the advantages to be derived from their use:

(i) However serious the attack, only about 5% of resistant plants are affected, whereas the proportion of sensitive local varieties affected may even be 100 %. Thus, the resistant variety ensures an intact crop, however virulent the rosette disease may be.

(ii) In all cases, the yield of resistant plants is always higher than that from the local variety: the average for the results over the space of three years gives a figure of 2,400 kg. as compared with 1,700 kg. for a local variety. The potential yield exceeds 3,000 kg.

(iii) The response to organic and chemical manuring (5 tons of farmyard manure and 75 kg. of plain superphosphate per hectare) is better in the case of the resistant varieties.

(iv) Moreover, the use of a resistant variety with manure gives an increase in yield of 130 %, as compared with that from a local variety without manure.

(d) These early results were made known to the peasants from 1960 onwards.

4. Genetic study of the nature of the resistance

(a) The second generation of hybrids obtained from resistant and early varieties were systematically infested with disease-carrying aphis. It was thus possible to control the number of resistant plants and so to deduce the mechanism of transmission of the resistance itself.

(b) It is a question of bihybridism which prevails entirely with a homomer gene; the F2 assortments correspond to the 15-1 type: 15 sensitive plants to 1 resistant plant. The "resistant" character is carried by the recessive double.

5. Hybridisation using resistant varieties

(a) The purpose of the various hybridisation programmes undertaken at the Station was to combine in the same hybrid both resistance to rosette and other desired characteristics such as high yield, large shells and earliness.

(b) Hybrid varieties were given comparative trials in 1961 and the results appear promising. Many genealogical selections were made with the most interesting of those following their assortments.

(c) The feature of earliness (a 90-day period) has never been known to occur naturally in association with resistance to disease.

(d) In an effort to combine these two features in the same hybrid, several back-crossing programmes were undertaken from 1959 onwards.

(e) The recurring parent is then the early variety, and at each F2 generation, the resistance of all plants is tested in order to select those which are resistant (these would seem to be in the ratio of 1:16) so that back crossing can be continued with these.

6. Conclusion

(a) The generalised use of resistant varieties coupled with organic and chemical or even simply chemical manuring has already enabled progressive cultivators to more than double their groundnut crop.

(b) The hybridisation which is now being carried on using resistant varieties give some hope of achieving a resistant hybrid which will also possess other desired characteristics: better yield, good shell quality, shorter growing cycle.

(c) It will always be possible to implement the achievements very quickly in a peasant community for the benefit of the Volta farmer.

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